

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.111 and in light of the remarks which follow are respectfully requested.

As correctly noted in the Office Action Summary, Claims 9-13, 23 and 24 are pending in the application and are under consideration.

By the above amendments, Claim 9 has been revised in response to the 35 U.S.C. §112, second paragraph, rejection and is further addressed below. In addition, Claim 9 has been revised to more recite the ring configuration of the backing plate. Support may be found, at least, in Fig. 2.

Turning to the Official Action Claims 9-13, 23 and 24 stand rejected under 35 U.S.C. §112, second paragraph, for allegedly not being indefinite. This rejection has been obviated by the above amendments where claim 9, has been revised to remove the typo, and the redundant phrase. Thus, withdrawal of this rejection is in order and it is respectfully requested.

Claims 9 and 23 stand rejected under 35 U.S.C. §103(a) as being allegedly over Fujitsu (Japanese Patent Document No. 59-179784) in view of Lester et al (U.S. Patent No. 3,630,881) and Zejda (U.S. Patent No. 5,112,467). This rejection is traversed for the following reasons.

The present invention relates to mechanically joined sputtering targets and adaptors for plasma sputtering apparatus.

In accordance with one aspect of the invention, and as set forth in amended claim 1, a target for installation in a vacuum chamber for processing a substrate by causing sputtering material to be ejected from the target onto the substrate is provided. The sputter target includes a disk-shaped section having two planar surfaces and an outer periphery, the disk-shaped section having at least one radially-inward step proximate to

the outer periphery. A continuous ring configured backing plate with an adapter having an inner radial flange and at least one groove therein to accommodate an o-ring. The radial flange is disposed in a mating relationship with the radially-inward step thereby preventing leakage into the vacuum chamber at the interface of the adapter and the vacuum chamber. The target is manufactured homogeneously of the sputtering material, and the disk-shaped section defining threaded holes proximate the outer periphery of said disk-shaped section.

Based on a complete understanding of the present invention as now claimed, it is respectfully submitted that the claims cannot properly be rejected under 35 U.S.C. §103(a) based on the teachings of Fujitsu, Lester et al and Zejda. The combination of features set forth in the independent claim and the claims dependent thereon are simply not disclosed or suggested by the applied documents. Moreover, there is no reasonable expectation of success in arriving at the claimed invention, by combining the applied documents in the manner suggested.

Fujitsu relates to a sputtering device for forming thin film on a substrate by applying direct current of high voltage on the target in a magnetron. See, translated abstract. Fujitsu fails to disclose or suggest the features of the invention claimed. For example, Fujitsu does not disclose or suggest a continuous ring configured backing plate, wherein the backing plate has a radial flange disposed in a mating relationship with a radially inner step of the target.

Fujitsu simply discloses a target (11) having a disk shaped backing plate (12), wherein the two are mechanically connected by screws (14) from the surface which is being sputtered. In contrast, the present invention recites a ring shaped backing plate (i.e., hollow in the middle) to accommodate the heat exchange system which is adjacent to the target.

The configuration of the backing plate in the claimed invention includes an adapter with an inner radial flange, which matches with the inward step of the target. This is not the case in Fujitsu, where the backing plate (12) does not even call for an adapter, much less an inner radial flange, which would match with target (11).

Further, the mechanical fastening of the target in the present invention is from the rear side of the backing plate, through the above-described flanges and into the non-sputtering surface of the target. On the other hand, Fujitsu discloses the mechanical fasteners (i.e., the screws) being introduced from the sputtering surface of the target through the target and into what appears to be blocks (15) which may or may not form part of the backing plate. Regardless of the unclarity of this last point, the fasteners being introduced from the sputtering surface would necessarily interfere with the sputtering process and would have a deleterious effect on the deposition on a semiconductor wafer.

Lester et al fails to cure the above-described deficiencies in Fujitsu. Lester relates to a target of a dielectric material, which is isolated from the sputtering chamber and the anode in the sputtering chamber by the target and its mounting structure. Col. 1, lines 15-18. The Official Action relies on Lester et al for the alleged disclosure of continuous ring having the requisite flanges and o-rings to hold the target in place. This position is improper. The ring (28) discussed in Lester et al maintains the second cathode (18) in alignment with the target (19), so that fluid from gap (27) does not flow between inner surface (21) and ring (23). However, ring (28) does not form part of the backing plate (that would be top plate (13)) and certainly does not have a mating relationship with target (19). In this regard, Lester et al states:

The target 19 . . . has a beveled or inclined outer surface 21 resting against cooperating beveled or inclined surface 21 of [sic] a supporting ring 23 The ring 23 has a beveled or inclined outer surface 24 inclined at an angle that results in the surface 24 being substantially parallel to the surface 21 of target 19. Col. 4, lines 50-58.

Clearly, ring (23) and not ring (28) is assembled together with target (19) which is in turn clamped by element (20) to backing plate (20). In fact, the structure disclosed in Lester et al is far more complex than the present invention, and very different from Fujitsu. But for improper hindsight gained from Applicants' invention, a skilled artisan would not have even looked to combine these documents.

Zejda relates to a cathode sputtering apparatus. Zejda has been applied for the alleged disclosure of utilizing threaded screws to secure the target. Official Action at pages 4-5. However, like Fujitsu and Lester et al, Zejda does not disclose or suggest or fairly suggest a continuous ring configured backing plate, wherein the backing plate has a radial flange disposed in a mating relationship with a radially inner step of the target. Thus, even if combined in the manner suggested the claimed artisan would not arrive at the claimed invention.

Claims 10-13 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Fujitsu in view of Lester et al and Zejda as applied to claims 9 and 23 above, and further in view of Inoue (U.S. Patent No. 5,244,556). This rejection is traversed for the following reasons.

Fujitsu, Lester et al and Zejda have been discussed in detail above. Inoue relates to a method for depositing a thin film on a substrate by a sputtering process, and more particularly to a method of depositing a thin film on a substrate by a sputtering process in which a high quality thin film can be stably deposited on the substrate at a high sputtering rate. Col. 1, lines 2-10.

Inoue has been applied for allegedly disclosing a vacuum pressure being applied to one side. Official Action at page 5. However, Inoue does not cure the above-described deficiencies in Fujitsu, Lester et al and Zejda. In particular, Inoue does not disclose or fairly suggest a continuous ring configured backing plate, wherein the backing plate has a radial flange disposed in a mating relationship with a radially inner step of the

- 8 -

target. Accordingly, withdrawal of this rejection is in order and it is respectfully requested.

Claim 24 stands rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Fujitsu in view of Lester et al and Zejda as applied to claims 9 and 23 above, and further in view of Wegmann et al (Great Britain Patent Document No. 2,173,217). This rejection is respectfully traversed.

Wegmann et al relates to a target holder for cathode sputtering including clamps for pressing the target onto a cooling surface. Co. 1, lines 4-8. Wegmann, like Fujitsu, Lester et al and Zejda simply does not disclose a continuous ring configured backing plate, wherein the backing plate has a radial flange disposed in a mating relationship with a radially inner step of the target. Thus, even if combined in the manner suggested one of ordinary skill would not arrive at the claimed invention. Accordingly, withdrawal of this rejection is in order and it is respectfully requested.

Entry of the foregoing and prompt and favorable consideration of the subject application on the merits are respectfully requested.

If there are any questions regarding this paper, or the application in general, the Examiner is invited to telephone the undersigned at his or her earliest convenience.

Respectfully submitted,



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